Fermentation Engineering

Course fee: $2,400

For course dates, visit go.ncsu.edu/btec_short_courses

In this three-day course, you will learn the fermentation principles and engineering fundamentals of growing recombinant microorganisms in a bioreactor to express therapeutic proteins. In addition, you will gain a fundamental understanding of the relationship between process design and product quality. You will also have the opportunity to engage in hands-on pilot-scale laboratory experiences that define and explore the critical control parameters required to achieve a robust fermentation process.

For additional information, please contact BTEC Professional Development and Marketing Coordinator Erica Vilsaint at embrown4@ncsu.edu.

Course schedule

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<th>Day 1</th>
<th>Day 2</th>
<th>Day 3</th>
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<tr>
<td>Lecture: Overview</td>
<td>Lecture: Oxygen transfer and kLa</td>
<td>Lab: Bioreactor inoculation and sampling</td>
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<tr>
<td>Lecture: Principles of fermentation (growth rate, yield and mass balances, productivity, CPP)</td>
<td>Lab: Oxygen transfer – kLa determination</td>
<td>Lecture: Critical control parameters (control limits, PID, methods of controlling)</td>
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<td>Lab: Microbial growth kinetics and yield in shake flasks</td>
<td>Lecture: Clean in Place of bioprocessing equipment (principles, CIP systems, design, validation and testing)</td>
<td>Lab: Effects of critical control parameters on microbial growth kinetics in 30 L bioreactors</td>
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<tr>
<td>Lecture: Bioreactor design (principles, materials, vessel geometry, disposable technology)</td>
<td>Lecture: Steam in Place (SIP equipment/ vessel, SIP media)</td>
<td>Lab: Feed strategy, automation, and process evaluation</td>
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<td>Lab: Orientation to intermediate-scale bioreactors</td>
<td>Lab: CIP – Set up and control of a CIP system for bioreactors</td>
<td>Lecture: Data interpretation</td>
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<tr>
<td>Lecture: Agitation and aeration (mixing, impellers, agitation intensity, airflow)</td>
<td>Lab: SIP – Preparing and batching a bioreactor</td>
<td>Course wrap-up</td>
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REGISTER NOW: go.ncsu.edu/btec_short_courses
What short course participants say about this course

“Getting hands-on time with the bioreactors was amazing and fun. The labs were well engineered.”

“The instructor and lab assistants were very friendly and helpful. This was a really good course!”

“The amount of time split between lab & lecture was great. It was also a good back and forth.”

“The lab technicians were professional and personable, and enthusiastic in their approach to helping and how to troubleshoot.”

About the instructor

Dr. Charles Rutter, a senior scientist at BTEC, has expertise in fermentation processes using bacteria, yeast, and algae. In addition, he has experience with bioreactor process development for non-model organisms and with molecular and synthetic biology for development of novel microbial strains.

Prior to joining BTEC, Dr. Rutter spent several years as a postdoctoral research fellow at the University of Illinois Urbana-Champaign, where he worked on engineering oleaginous yeast species to produce novel lipid-based products through both genetic and reactor engineering approaches. Dr. Rutter earned his doctorate in chemical and biomolecular engineering from Georgia Institute of Technology.

Important information for short course participants

Location

This course is held on site at BTEC. The Golden LEAF BTEC building is located at 850 Oval Drive on NC State University’s Centennial Campus.

Payment

BTEC accepts payment from all major credit cards including American Express, Visa, and MasterCard. If you wish to pay by company check, please email melody_woodyard@ncsu.edu for additional information immediately after registering.

Discounts available

A 20% discount is available to:

- Employees of NC Biotech Manufacturers Forum (BMF) member companies
- Groups of five or more from one company registering for the same offering of this course
- Individuals registering for more than one course at a time
- Faculty/staff working in academic environments

Pre-course communication

Registered course participants will receive an email three weeks before the scheduled course with detailed information regarding travel to BTEC, parking information, and a short pre-course questionnaire.

Cancellation policies

CANCELLATION BY REGISTRANT

To cancel a registration and be eligible for a refund of course fees, you must notify BTEC by email. Fees are refunded according to the following schedule:

- 100% refund – If notification is received at least 15 business days in advance of course start date
- 75% refund – If notification is received 10–14 business days in advance of course start date
- 50% refund – If notification is received 6–9 business days in advance of course start date
- No refund will be issued if notice is received 5 or fewer business days in advance of course start date

Substitutions may be made up to two business days prior to the course start date.

CANCELLATION BY BTEC

BTEC retains the right to cancel a professional development short course no less than 10 business days in advance of the scheduled course start date. Registrants will be notified by BTEC if a course is cancelled and will receive a full refund of registration fees paid. BTEC is not responsible for airfare penalties or other costs incurred due to cancellation.